11:30 a.m.

894-5 Use of a Blood Substitute to Determine Instantaneous Murine Right Ventricular Thickening With Optical Coherence Tomography

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Background: A satisfactory imaging technique to determine regional wall thickening of the murine myocardium is not available. Although cardiovascular imaging with light offers a novel solution, application is problematic because scattering by RBC's causes optical attenuation.

Methods and Results: Optical Coherence Tomography (OCT) is a technique for high resolution imaging of biological tissues. To reduce scattering, murine blood was replaced with a hemoglobin-based blood substitute. The scattering and absorption properties of *in vitro* preparations of whole blood and dilutions of blood with a blood substitute were determined with a spectrophotometer. A reduction in light scattering occurred at a hematocrit less than 5%.

A fiber-optic OCT imaging system was used to image the murine RV before (Figure above) and after (Figure below) isovolumic replacement with blood substitute (n=6). Light attenuation prevented full thickness imaging before replacement, while visualization of the full ventricular thickness was possible after replacement. Baseline and imaging hematocrits were 52.4 ± 3.8% and 3.7 ± 1.2%. End systolic and diastolic thickness values were 0.458 ± 0.051 mm and 0.352 ± 0.047 mm. Percent thickening fraction was 30.8 ± 7.5%.

Conclusion: Optical imaging of the intact beating murine RV was substantially improved by isovolumic blood replacement with a hemoglobin-based blood substitute. A blood substitute may also be applied to other optical techniques under investigation in cardiology.

11:45 a.m.

894-6 Three-Dimensional Reconstruction of Coronary Arteriole Plexus Image by Contrast Echocardiography Using High Frequency Transducer

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Background: Real time myocardial contrast echocardiography (MCE) may visualize fine anatomy of coronary microcirculation. But resolution is limited because of low frequency of the transducer having second harmonic mode.

Purpose: The aim of this study was to examine the efficacy of newly developed high frequency liner probe for fine quality MCE.

Methods: A new high frequency liner transducer for harmonic imaging (4.2/8.0 MHz) was set to Toshiba SSA-770A (Aplio). Real-time myocardial perfusion image with low mechanical index (0.1) and intermittent flash image with relatively high MI (0.4) was recorded on the dual display during infusion of Definity in 5 open chest dogs. As arteriole plexus was demonstrated by flash imaging, simple 3-D image was reconstructed by built-in 3-D system.

Result: Real time MCE provided a fine and clear perfusion image of the adjacent wall to the transducer. Using flash mode, fine dots and lines of contrast echo showing arteriole were evident and simple 3-D image was easily and quickly obtained as shown in a figure.

Conclusion: A new high frequency transducer could demonstrate fine and clear opacification image which could not be obtained by conventional probes. Although 3-D reconstruction image was simple and easy, it might provide a new information about coronary arterioles.